XILVER™

DROPLET™

Droplet™, automated LED luminaire
User manual v2.0

DECLARATION OF CONFORMITY

Manufacturer: Xilver B.V.

Address: Stationsstraat 44a
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The Netherlands

Declares that the product

Droplet™

Is in compliance with the following standards:

CE-measurements in accordance with the EMC and LvD standards

EN 55103-1	Part1: Emission
EN 55103-2	Part 2: Immunity
EN 61000-4-2	ESD
EN 61000-4-3	HF immunity
EN 61000-4-4	EFT
EN 61000-4-5	Surge
EN 61000-4-6	CDN / Clamp injection
EN 61000-4-8	Power Magnetic field, extended to 10kHz
EN 61000-4-11	Dips and Voltages Fluctuations
EN 61000-4-16	Immunity to conducted common mode disturbance
EN 61000-3-2	Harmonic currents
EN 61000-3-3	Flicker
EN 60598	Electrical Safety for Luminaires

Maastricht, March 2003

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1. INTRODUCTION

Thank you for buying the Xilver Droplet™, an entirely new concept in lighting technology and lighting application.

The Droplet™ is the smallest and first moving LED luminaire with accurate 16 bit fully adjustable pan and tilt. With a pan travel of 360° and a tilt of 260°. The LED light source is comparable in white output to a 50 Watts halogen reflector bulb and in colors even brighter. It has an expected lifetime of 100.000 hours.
The color combining system enables you to produce virtually any color with HSI (Hue, Saturation and Intensity) or RGB color mixing without having multi-color shadows. It is possible to create either fluent or lightning fast color changes. Impressive white and full color strobes can be controlled by the frequency and duration channel.

Prepared for installation: low power consumption, light weight, small size, universal mounting plate, no cables or connectors visible, extension shaft available and custom housing colors make full integration in its environment possible.

The luminaire is convection cooled, direct driven by stepper motors and needs therefore low maintenance.

Read this manual carefully Before using the Droplet™ and use it as a guide to guarantee proper use of this new concept in lighting. If you have any questions please contact your supplier.

This manual will first explain you how to use the Droplet™, 2.1 Configuration. In part 2.2 Functionality you can find a detailed description of all the functions. To adapt the Droplet™ fully to your desires we offer some accessories to extend the applicability. The place of usage, maintenance requirements and terms of warranty will be quoted in the last 3 paragraphs.
To this manual is added 1 appendix, one sheet that gives you an overview of the technical specifications, the dipswitch functions and the DMX mapping.

2. PRODUCT DESCRIPTION

2.1. Configuration

2.1.1. Unpack the Droplet

The Droplet™ is delivered in a custom designed packing to protect the unit during transport. Refuse parcels in damaged condition!

Use this package always to transport the Droplet™.

The package contains:
- Droplet™ luminaire
- User manual
- Droplet™ quick reference sheet
- Mounting plate, including 4 Plastic feet
- 2 M3*10 counter sink screws

2.1.2. Install the Droplet

Make sure the unit is installed in an environment that complies with the prescriptions of paragraph 2.4. Place of usage. Install the Droplet™ in 4 steps:

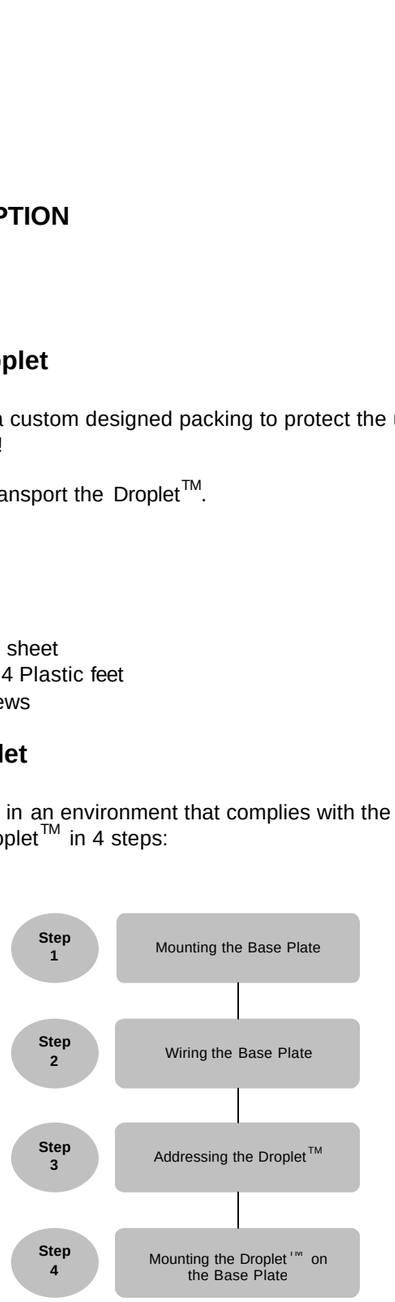

Figure 1.: Install the Droplet™ in 4 steps

Step 1: Mounting the Base Plate

Make sure that the base plate is always equipped with the 4 plastic feet when using or installing the Droplet™.

Standing Droplet™:
The Base Plate is provided with 4 holes. These holes can be used to mount the delivered plastic feet. Click the narrow part of the foot into the hole, then push the rod into the foot and it is fixed on the Base Plate.

Hanging Droplet™:
In the centre of the Base Plate is a hole with a diameter of 10mm (0,39inch) reserved for the fixing of hooks and clamps, for example a G-clamp.

Caution: the Nut, O-ring or Bolt that will be turned to the inside of the Droplet™ should not be higher than 10mm (0,39 inch).

Fixed installation:
There are 2 slotted holes in the base plate, 1 is reserved for the power cable(s) and the other is reserved for the data cable(s). Before mounting the plate put the wiring for the Droplet™ trough the holes.

The base plate can be fixed on a electric wall box. It is also possible to mount the base plate on wood or other rigid materials, respecting proper and flat mounting of the base plate. Use screws with a max. diameter of 3mm / 0.12inch and make sure the base plate is fixed well.
The Droplet™ may be used in virtually any direction: standing, hanging in vertical direction as fixed on a wall, hanging horizontally.

Caution: to guarantee the stability and durability of the unit in horizontal direction make sure that the unit is placed with the logo's on the base placed on the vertical axis!

Warning: A Droplet™ with extension shaft may only operate hanging (max. extension length: 55cm / 21.65inch) in vertical direction or standing (max. extension length: 20cm / 7.87inch).

Step 2: Wiring the Base Plate

Power

Input
The Droplet™ is provided with an internal wide range power supply. It operates on a voltage range from 100 to 240VAC at a frequency of 50 to 60Hz, no switches that need to be changed.

Consumption
The fixture has a maximum power consumption of 35 Watts.

Wiring
You need a 2 pole power cable of 0.75mm^2 to 1.5mm^2 / 18AWG to 16AWG to provide the Droplet™ with power. Use always stranded wire for the power.

Warning: Do not apply power while connecting the cables!

Connection of the 2 poles into the power connector on the Base Plate:

Fig 2: schematic top view of the Power connector block

Pin / Hole	Mark	Description
a	“L”	Live
b	“N”	Neutral

Table 1: power cable specification

The power cables should be stripped for 5mm (0.20inch), crimp a ferrule on the stripped part for a reliable connection. Push the first conductor into hole ‘a’ until the cable isolation touches the connector. Then tighten screw 1, hand fixed, make sure the cable is well fixed, check this by pulling it strong. Do the same for the second conductor.

Attention: after turning off the power of the Droplet™ wait at least for 5 seconds before turning the power on again, otherwise it might occur that the Droplet™ does not initialize correctly.

Data

Control
The Droplet™ can be controlled by the USITT DMX512 protocol, hereinafter called DMX. The Droplet™ uses minimal 7 channels (reduced mode HSI) and maximal 12 channels (normal mode RGB).

Wiring
You need a 3 pole data cable to provide the Droplet™ with data. For cable requirements see the USITT DMX512 protocol. Connection of the Data in / out into the data connector on the Base Plate: *picture*

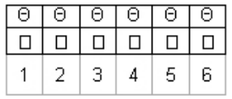

Fig 3: schematic top view of the Data connector block

Pin / Hole	Mark	Description
1	⏚	Ground out
2	+	Hot out
3	-	Cold out
4	⏚	Ground in
5	+	Hot in
6	-	Cold in

Table 2: Data cable specification

The data cables should be stripped for 5mm (0.20inch), crimp a ferrule on the stripped part for a reliable connection.. Push the first cable: ‘ground out’ into hole 1 until the cable isolation touches the connector. Then tighten screw 1, hand fixed, make sure the cable is well fixed, check this by pulling it once. Repeat this actions for the hot out and cold out, hot in and cold in and for the ground in.

Termination at the end of a DMX line:
- for fixed installation, place a resistor of 120ohm between hole 2 and 3 of the “data out” connector
- termination plug with a resistor of 120ohm between pole 2 and pole 3

Address settings
To control each Droplet™ individually via DMX, each unit should have a unique identity. This identity can be given by the DMX address settings. There is a dipswitch on the bottom of the fixture to set the DMX address.

Warning: when changing the dipswitch settings of the Droplet™ make sure the power of the unit is turned off!

Step 3: Addressing the Droplet™

Dipswitch functions

Dipswitch	1	2	3	4	5	6	7	8	9	10	11	12
Function	DMX-LSB								DMX-MSB	Mixing Method	Address Range	Reserved
Position 0	Address setting (binary)									H S I	Normal	
1	1	2	4	8	16	32	64	128	256	R G B	Compact	

Table 3: Dipswitch functions

The Dipswitch of the Droplet™ has 12 switches. The first nine switches are meant for the DMX address setting. Switch number 10 is meant for the method of color mixing and switch 11 defines whether the Droplet™ functions in normal or compact mode to reduce the number of required channels.

DMX Mapping

	Compact		Normal	
Channel	H S I color mixing	R G B color mixing	H S I color mixing	R G B color mixing
1	Reset	Reset	Reset	Reset
2	Pan	Pan	Pan	Pan
3	Tilt	Tilt	Tilt	Tilt
4	Strobe frequency	Strobe frequency	Speed	Speed
5	Hue	Red	Pan Fine	Pan Fine
6	Saturation	Green	Tilt Fine	Tilt Fine
7	Intensity	Blue	Strobe frequency	Strobe frequency
8		Intensity	Strobe Duration	Strobe Duration
9			Hue	Red
10			Saturation	Green
11			Intensity	Blue
12				Intensity

Table 4: DMX - mapping

For example:

You have 5 Droplets and you want to control them individually. If you choose for the normal mode and HSI color mixing each fixture has 11 channels (this is also the default setting), this means each Droplet™ uses 11 addresses from the set start address. So the first Droplet™ receives address number 1, the second 12, the third 23, the fourth 34 and the fifth 45. Make sure the Droplets have separated addresses!

Mode and address settings with the dipswitch:

Fixture 1:

1	2	3	4	5	6	7	8	9	10	11	12
1	0	0	0	0	0	0	0	0	0	0	0

Fixture 2:

1	2	3	4	5	6	7	8	9	10	11	12
0	0	1	1	0	0	0	0	0	0	0	0

Fixture 3:

1	2	3	4	5	6	7	8	9	10	11	12
1	1	1	0	1	0	0	0	0	0	0	0

Fixture 4:

1	2	3	4	5	6	7	8	9	10	11	12
0	1	0	0	0	1	0	0	0	0	0	0

Fixture 5:

1	2	3	4	5	6	7	8	9	10	11	12
1	0	1	1	0	1	0	0	0	0	0	0

Step 4: Mounting the unit on the Base plate

Make sure spacer 1 fits into hole 1 and spacer 2 fits into hole 2. Push until the power and date pins slide into the connectors I and II on the base plate. The unit will cover the whole base plate.

Fix the unit on the base plate with help of the M3*10 counter sink screws. The screws must be placed in the two holes on top of the base near the Xilver™ logo.

2.2. Functionality

Movement
The Droplet™ has a 16bit pan and tilt movement in the normal mode and a 8bit in the compact mode. In the normal mode the movement is controlled by 5 channels (pan, tilt, pan fine, tilt fine and motor speed). In the compact mode there is no pan and tilt fine and no motor speed channel.
The pan and tilt movement is direct driven by stepper motors. The travel of the pan movement is 360° and the travel of the tilt movement is 270°. Divided over 255 steps the pan moves 1,41° per step and the tilt 1,05° per step, with the fine channels each step is divided again in 255 steps. The pan and tilt fine are used for precision positioning.

Motor speed
The speed of the pan and tilt movement can be adapted via the motor speed channel. When the channel is zero (in the compact mode this channel is not available), the Droplet™ moves at full speed.

Strobe
The Droplet™ has a 2 channel strobe function in the normal mode. The Frequency and the duration are adjustable. With frequency you can determine how many times the Droplet™ should flash per second, with the duration channel you can determine how long one flash should take. In the compact mode only the frequency function is available.

Color mixing

HSI-mode
HSI stands for **H**ue, **S**aturation and **I**ntensity. The HSI color mixing mode uses 3 channels.
The Hue channel enables you to choose a color, via this way you can choose up to 255 saturated colors. The Saturation channel enables you to choose between fully saturated colors and pastel colors. The Intensity channel functions like a normal dimmer, from no output to full output. By Hue and Saturation channel zero and the Intensity channel full max, the output of the Droplet™ is white. Changing the Saturation channel to max the output will turn into Red. Now you can choose a color with the Hue channel.

RGB-mode
RGB is stands for **R**ed, **G**reen and **B**lue. Each of these colors use one channel, via this channel you can adjust the output of the concerned color. To vary the output of the 3 colors, you can make each desired color. Besides there is an Intensity channel to make it easy dimming the total output of the Droplet™. If the three color channels are max the Droplet™ gives no real white, you have to vary the output of the separate colors to get white.

Reset
Via the reset channel the Droplet™ can be given its starting values again, so the fixture returns to its point of departure.
It may occur, due to external causes that the Droplet™ gets out of its position. The reset channel can be used to make sure that the unit follows the given DMX values the right way again.
To give the Droplet™ a reset, set the reset channel for 5 seconds max.

Normal mode RGB

DMX Channel	Function	Decimal	Percent	Description
1	Reset	0 - 249 250 -255	0 - 97 98 - 100	Reserved for special functions Hold for 5 seconds to reset the Droplet™
2	Pan	0 - 255	0 - 100	Position from 0° - 360°
3	Tilt	0 - 255	0 - 100	Position from 0° - 260°
4	Speed	0 255	0 - 100	Full speed of pan and tilt movement Slowest pan and tilt movement
5	Pan fine	0 - 255	0 - 100	Fine Positioning of the pan within an angle of 1,41°
6	Tilt fine	0 - 255	0 - 100	Fine Positioning of the tilt within an angle of 1,02°
7	Strobe Frequency	0 - 4 5 - 204 205 - 255	0 - 2 3 - 80 81 - 100	Full on, no strobe Strobe linear from 1Hz to 25Hz Strobe linear from 25Hz to 50Hz
8	Strobe Duration	0 - 255	0 - 100	Linear from 0 – 100% with steps of 1,6%
9	Red	0 - 255	0 - 100	Linear Red output from 0 – 100%
10	Green	0 - 255	0 - 100	Linear Green output from 0 – 100%
11	Blue	0 - 255	0 - 100	Linear Blue output from 0 – 100%
12	Intensity	0 - 255	0 - 100	Linear overall output from 0 – 100%

Compact mode RGB

DMX Channel	Function	Decimal	Percent	Description
1	Reset	0 - 249 250 -255	0 - 97 98 - 100	Reserved for special functions Hold for 5 seconds to reset the Droplet™
2	Pan	0 - 255	0 - 100	Position from 0° - 360°
3	Tilt	0 - 255	0 - 100	Position from 0° - 260°
4	Strobe Frequency	0 - 4 5 - 204 205 - 255	0 - 2 3 - 80 81 - 100	Full on, no strobe Strobe linear from 1Hz to 25Hz Strobe linear from 25Hz to 50Hz
5	Red	0 - 255	0 - 100	Linear Red output from 0 – 100%
6	Green	0 - 255	0 - 100	Linear Green output from 0 – 100%
7	Blue	0 - 255	0 - 100	Linear Blue output from 0 – 100%
8	Intensity	0 - 255	0 - 100	Linear overall output from 0 – 100%

Normal mode HSI

DMX ch	Function	Decimal	Percent	Description
1	Reset	0 - 249 250 -255	0 - 97 98 - 100	Reserved for special functions Hold for 5 seconds to reset the Droplet™
2	Pan	0 - 255	0 - 100	Position from 0° - 360°
3	Tilt	0 - 255	0 - 100	Position from 0° - 260°
4	Speed	0 255	0 - 100	Full speed of pan and tilt movement Slowest pan and tilt movement
5	Pan fine	0 - 255	0 - 100	Fine Positioning of the pan within an angle of 1,41°
6	Tilt fine	0 - 255	0 - 100	Fine Positioning of the tilt within an angle of 1,02°
7	Strobe Frequency	0 - 4 5 - 204 205 - 255	0 - 2 3 - 80 81 - 100	Full on, no strobe Strobe linear from 1Hz to 25Hz Strobe linear from 25Hz to 50Hz
8	Strobe Duration	0 - 255	0 - 100	Linear from 0 – 100% with steps of 1,6%
9	Hue	 0 1 - 42 43 44 - 84 85 86 - 127 128 129 -170 171 172 - 212 213 214 - 254 255	 0 1 - 16 17 18 - 32 33 34 - 49 50 51 - 66 67 68 - 82 83 84 - 99 100	Linear fading through all saturated colors if the Saturation channel has value 255 Red Red <> Yellow Yellow Yellow <> Green Green Green <> Cyan Cyan Cyan <> Blue Blue Blue <> Magenta Magenta Magenta <> Red Red
10	Saturation	0 - 255	0 - 100	Linear fading from white to saturated color chosen via the Hue channel
11	Intensity	0 - 255	0 - 100	Linear fading from 0 – 100% output

Compact mode HSI

DMX ch	Function	Decimal	Percent	Description
1	Reset	0 - 249 250 -255	0 - 97 98 - 100	Reserved for special functions Hold for 5 seconds to reset the Droplet™
2	Pan	0 - 255	0 - 100	Position from 0° - 360°
3	Tilt	0 - 255	0 - 100	Position from 0° - 260°
4	Strobe Frequency	0 - 4 5 - 204 205 - 255	0 - 2 3 - 80 81 - 100	Full on, no strobe Strobe linear from 1Hz to 25Hz Strobe linear from 25Hz to 50Hz
5	Hue	 0 1 - 42 43 44 - 84 85 86 - 127 128 129 -170 171 172 - 212 213 214 - 254 255	 0 1 - 16 17 18 - 32 33 34 - 49 50 51 - 66 67 68 - 82 83 84 - 99 100	Primary colors if Saturation channel has value 255 Red Red <> Yellow Yellow Yellow <> Green Green Green <> Cyan Cyan Cyan <> Blue Blue Blue <> Magenta Magenta Magenta <> Red Red
6	Saturation	0 - 255	0 - 100	Linear fading from white to saturated color chosen via the Hue channel
7	Intensity	0 - 255	0 - 100	Linear fading from 0 – 100% output

2.3. Accessories

Standard supplied

Lenses
When delivered the has a beam angle of 10°. Additional supplied with each Droplet™ are two lenses, one with a beam angle of 18° and the other with a beam angle of 30°.

Replacing a lens
To replace a lens of the Droplet™ first take of the front hood by pulling the front hood. The existing lens or lens dome can be taken out. When you want to have a larger beam angle and the lens dome take out the black synthetic ring. Than first place the 18° or 30° lens and than the lens dome. The lenses should be placed with the uncurved side pointing to the Droplet™ and the curved side to the outside.

Extension shaft
The head of the Droplet™ can be taken of of the base and can be extended this way. Xilver B.V. supplies optional extension shafts for this purpose.
The following sizes of extension shafts can be delivered out of stock:

- 15cm (5,91inch)
- 25cm (9,84inch)
- 35cm (13,78inch)

Other sizes can be delivered on request.

The extension shaft is standard colored in silver (RAL 9006), black (RAL 9005) or white (RAL 9003). On request it can be delivered in any RAL color or even in custom color.

Warning: A Droplet™ with extension shaft may only operate hanging (max. extension length: 55cm / 21.65inch) in vertical direction or standing (max. extension length: 20cm / 7.87inch).

Cables
The Droplet™ is standard delivered without cables and connectors. On request the Droplet™ can be pre-wired with Data and power cable with the desired connector.

2.4. Place of usage

The Droplet™ is mentioned for indoor use only! The product may not be exposed to water or extreme hot or cold environments.
The Droplet™ should not be used in humid environments. The minimum operation temperature of the Droplet™ is 0°C (32°F) and the maximum is 40°C (104°F). The minimum storage temperature of the Droplet™ is -10°C (14°F) and the maximum is 60°C (140°F).

In case of building-in the base of the Droplet™ make sure there is enough ventilation so the unit becomes not overheated.
Should the Droplet™ get overheated in case of a too high environment temperature or not enough ventilation, the Droplet™ will limit its light output to protect the LEDs.

Warning: during the use of the Droplet™ make sure that no persons or objects get in contact with the unit in a direct way. The pan and tilt travel should always be free to make sure the unit doesn't looses its position.

2.5. Maintenance

Cleaning

The interior of the Droplet™ needs low or even no maintenance because the fixture is convection cooled and the head of the Droplet™ is completely closed.

The exterior of the Droplet™ can be easily whipped of with a slightly moistened cloth. Make sure that when doing this, the power of the fixture is turned off!

2.6. Safety warnings

Warning: Do not touch the fixture during operation, the temperature of some parts of the fixture can rise up to 80°C (176°F).

Warning: Do not stare into the beam of the Droplet™, the intense light output can cause injuries to your eyes.

3. TERMS OF WARRANTY

By ‘normal’ use of the product the manufacturer, Xilver B.V. gives 2 years of warranty. Normal use means:

Use within the specifications as prescribed in paragraph 2.1. Install the Droplet™.
Use within the specifications as prescribed in paragraph 2.4. Place of usage.
Taking in consideration the maintenance prescriptions of paragraph 2.5. Maintenance.

Returning of the product in case of warranty, always contact your supplier for further instructions.

4. APPENDICES

Technical Specifications

Voltage	100-240VAC 50-60Hz
Power	Max. 35W
Data	USITT DMX 512 Protocol XSI Xilver Serial Interface
	Compact HSI mode: 7 channels Compact RGB mode: 8 channels Normal HSI mode : 11 channels Normal RGB mode : 12 channels
Standard beam angle	10° (supplied lenses: 18° and 30°)
Dimensions	Ø130mm x h185mm (Ø5,11inch x h7,25inch)
Weight	1,5kg (3,3lbs)
Pan	360° travel
Tilt	260° travel
Operation temperature	Min. 0°C (32°F) Max. 40°C (104°F).
Storage temperature	Min. -10°C (14°F) Max. 60°C (140°F).

Dipswitch functions

Dipswitch	1	2	3	4	5	6	7	8	9	10	11	12
Function	DMX-LSB								DMX-MSB	Mixing Method	Address Range	Reserved
Position 0	Address setting (binary)									H S I	Normal	
1	1	2	4	8	16	32	64	128	256	R G B	Compact	

DMX mapping

	Compact		Normal	
Channel	H S I color mixing	R G B color mixing	H S I color mixing	R G B color mixing
1	Reset	Reset	Reset	Reset
2	Pan	Pan	Pan	Pan
3	Tilt	Tilt	Tilt	Tilt
4	Strobe frequency	Strobe frequency	Speed	Speed
5	Hue	Red	Pan Fine	Pan Fine
6	Saturation	Green	Tilt Fine	Tilt Fine
7	Intensity	Blue	Strobe frequency	Strobe frequency
8		Intensity	Strobe Duration	Strobe Duration
9			Hue	Red
10			Saturation	Green
11			Intensity	Blue
12				Intensity